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(58) Field of Search

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(54) Loudspeaker or microphone having two voice coils

(57) A loudspeaker or microphone 16 has a single acoustic input/output 18 and includes a pair of electrical input/outputs 28,29 and a coil 23,24 for each input/output, the coils 23,24 being unmatched or of different impedance. The loudspeaker or microphone may be of either the moving-coil or moving-armature type.

One coil is associated with a local communications network and the other is associated with a high powered communications network, e.g. "Chat net" or "command net", when used by the emergency services or the military.

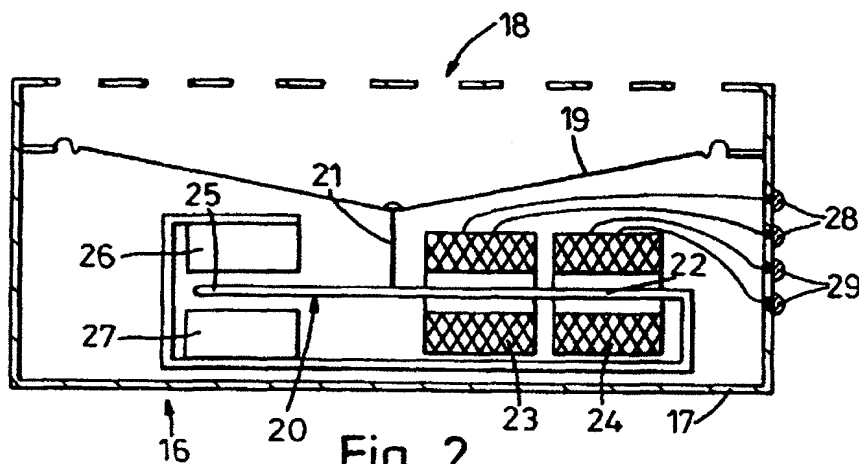


Fig. 2

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1995

GB 2 301 728 A

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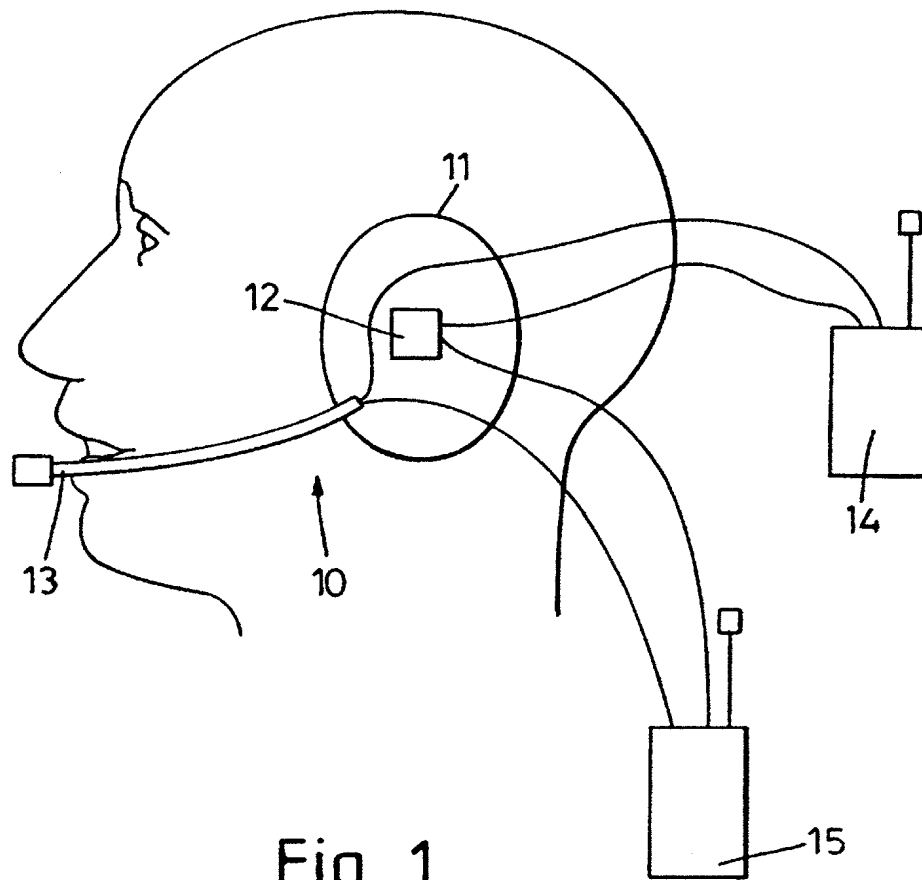


Fig. 1

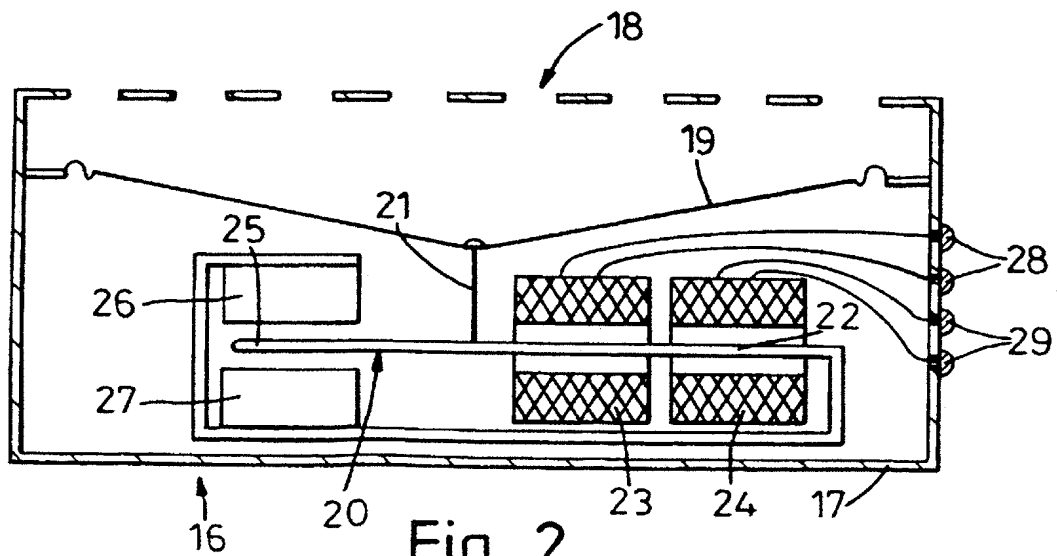


Fig. 2

ELECTROMAGNETIC ACOUSTIC TRANSDUCERS

This invention relates to electromagnetic acoustic transducers and in particular, but not exclusively, to ear-pieces and microphones for use in communication systems.

5 There are a number of situations where people require a first communication system for local communications with their fellow workers, and a second communication system so that they can receive command instructions from a remote NHQ. The first is sometimes known as the "Chat Net", whilst
10 the second is known as the "command net". Typical users might be divers, emergency service workers or soldiers.

 In many existing services of this type, the command network is of high impedance, whilst the Chat Net is providing by low-impedance, cheap walkie-talkie style
15 communication system. This mismatch in impedance means that separate ear-pieces are required for the two communication systems and the microphone has to be fed via a bulky transformer in order that it can be outputted at a matched impedance to the respective system.

20 The present invention consists in an electro-magnetic acoustic transducer having a single acoustic input/output and including a pair of electrical input/outputs and a coil for each input/output, the coils being of different impedances.

25 Thus, one coil can have an impedance to match the Chat Net, whilst the other coil can have an impedance to match the command net. Typically, the ratio of impedances may be

of the order of 1:10.

Thus, one input/output may be associated with the local communications network and the other may be associated with the high-powered communications network.

5 The coils may be electrically independent, or alternatively they may be bifilar wound or one coil may be a tapped portion of the other.

10 All of these arrangements are distinguished from the Class B amplifier situation, where a single, centrally-tapped coil is used in order to process a single signal. In that arrangement the coils themselves must be exactly matched one with the other.

15 The invention also includes a microphone including a transducer as set out above having a pair of inputs and an ear-piece including a transistor as set out above including a pair of outputs. The invention further includes a headset including a microphone as just defined and/or an ear-piece as just defined. In a still further arrangement, the transducer could be both microphone and ear-piece
20 (loudspeaker) with one coil acting as a microphone coil and one coil acting as the ear-piece coil. In this arrangement two microphone coils and/or two earpieces coils could be provided to enable two communications systems to be used.

25 Although the invention has been defined above, it is to be understood that it includes any inventive combination of the features set out above, or in the following description.

 The above may be performed in various ways and specific embodiments will now be described by way of example, with

reference to the accompanying drawings, in which:

Fig 1 is a schematic view of a head-set and communications system; and

5 *Fig 2* is a schematic section through and electro-magnetic acoustic transducer.

A head-set, which is generally indicated at 10, includes a ring 11 which surrounds the user's pinna and supports an ear-piece 12, and a boom microphone 13. A first local or Chat Net communication system 14 is attached to both the microphone 13 and the ear-piece 12 and a second command net communications system 15 is similarly connected.

Turning to *Fig 2*, a transducer 16, has a housing 17, having an acoustic input/output 18. A diaphragm 19, extends across the housing 17, and is connected to a reed 20, via a pin 21. The mid-portion, 22, of the reed 20, is surrounded by first and second coils 23, 24, whilst the tip 25, lies between permanent magnets 26, 27. These magnets are magnetically coupled to the base of the reed 25.

Apart from the provision of 2 coils, the transducer is entirely conventional and its operation will be fully understood by one skilled in the art. The coil 23, is connected via terminals 28, to the first communications system 14, whilst the coil 24, is connected by terminals 29, to the communications system 15. In this way, each communication system can either feed signals to the transducer 16 (when it is acting as an earphone), or receive signals from the transducer 16, when it is acting as microphone. Thus, with this surprising, but simple,

alteration to the transducer a single microphone and a single earpiece can be used for both communications systems, without the need for any transformer, because the respective impedances of the coils 23, 24, can be selected to match
5 their respective communications system.

Quite apart from reducing weight, cost and bulk, the system has an additional advantage inasmuch as it leaves one ear open so that the user can hear warning shouts or other noises, particularly in training situations.

10 As has been mentioned above, the coils do not necessarily need to be either physically or electrically distinct; the low-impedance coil can, for example, be tapped from the high-impedance coil and in that case the number of terminals can be reduced to three. The advantage of having
15 two separate coils, or a bifilar winding is that thicker wire can be used for the low-impedance coil.

The transducer may be balance armature (as shown in the drawings) or a dynamic transducer such as a moving coil. As has been mentioned above, the transducer may form a
20 microphone and a loudspeaker/ear-piece by using one coil for the microphone and one coil for the ear-piece. In that case, four coils may be provided (two microphone coils and two ear-piece coils) if the transducer is to be used with two communications channels.

Claims

1. An electromagnetic acoustic transducer having a single input/output and including a pair of electrical inputs/outputs and a coil for each input/output, the coils
5 being unmatched or of different impedance.
2. A transducer as claimed in claim 1 wherein the ratio of the impedances is of the order of 10:1
3. A transducer as claimed in claim 1 wherein one input/output is associated with a local communications
10 network and the other is associated with a high powered communications network.
4. A transducer as claimed in any one of the preceding claims wherein the coils are not electrically connected.
5. A transducer as claimed in any one of claims 1 to 3
15 wherein the coils are bifilar wound.
6. A transducer as claimed in any one of claims 1 to 3 wherein one coil is a tapped portion of the other.
7. An electromagnetic transducer substantially as hereinbefore described.
- 20 8. A microphone including a transducer as claimed in any one of the preceding claims having a pair of inputs.
9. An earpiece including a transducer as claimed in any one of the claims 1 to 8 including a pair of outputs.
10. A head set including a microphone as claimed in claim
25 8 and/or an earpiece as claimed in claim 10.